Magnetic properties of ultrathin films of Ni/Cu(001) probed by soft-x-ray magnetic circular dichroism

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Magnetic properties of ultrathin films of Ni/Cu(001) probed by soft-x-ray magnetic circular dichroism (abstract)

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The magnetic properties of MBE-grown ultrathin Ni films on a Cu(001) substrate are investigated using soft-x-ray magnetic circular dichroism (SXMCD) spectroscopic technique. These measurements are carried out by recording Ni $L_{2,3}$ absorption spectra with highly circularly polarized soft x rays recently obtained at the AT&T Bell Laboratories Dragon synchrotron radiation beamline.[1] For low Ni coverages, no MCD effect along the ⟨100⟩ direction is observed at room temperature, while for intermediate coverages, the MCD effect becomes appreciable and increases to its bulk value at ~25 ML. With only the assumption that the unoccupied density of states of Ni lie mainly in the minority bands, the amount of the MCD effect can be related to the magnetic moment. The thickness and temperature dependence of the magnetic moment obtained from our SXMCD measurements are compared with those of Ni/Cu(111) obtained from magneto-optical data.[2] The advantages and differences between the SXMCD and MOKE techniques are discussed. The novel SXMCD technique allows for element specific magnetic characterization of a variety of interesting structural architectures including 2 D films, dilute impurities, and disordered matrices.

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